

What is Claimed is:

1. A powder batch of battery particles, wherein said particles are substantially spherical and have a weight average particle size of from about 0.1 μm to about 20 μm , and wherein said particles have a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.
2. A powder batch as recited in Claim 1, wherein said average particle size is from about 0.3 μm to about 10 μm .
3. A powder batch as recited in Claim 1, wherein said average particle size is not greater than about 5 μm .
4. A powder batch as recited in Claim 1, wherein not greater than about 1 weight percent of said particles are in the form of hard agglomerates.
5. A powder batch as recited in Claim 1, wherein said particles comprise no more than about 0.1 atomic percent impurities.
6. A powder batch as recited in Claim 1, wherein said particles have the general formula $\text{Li}_y\text{M}_x\text{O}_z$, wherein Y is 0 to 2 and M is selected from Mn, Co, Ni and combinations thereof.
7. A powder batch as recited in Claim 1, wherein said particles comprise crystallites having an average crystallite size of at least about 20 nanometers.
8. A powder batch as recited in Claim 1, wherein said particles are substantially spherical.
9. A powder batch as recited in Claim 1, wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

10. A powder batch of fine battery particles having the general formula $\text{Li}_y\text{M}_x\text{O}_z$, wherein said particles have a weight average particle size of from about 0.1 μm to about 10 μm and wherein at least about 80 weight percent of said particles are not larger than twice said average particle size

11. A powder batch as recited in Claim 10, wherein said average particle size is from about 1 μm to about 5 μm .

12. A powder batch as recited in Claim 10, wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

13. A powder batch as recited in Claim 10, wherein said particles are substantially spherical.

14. A powder batch as recited in Claim 10, wherein said particles comprise crystallites having an average size of at least about 20 nm.

15. A powder batch as recited in Claim 10, wherein said battery particles comprise no more than about 0.1 atomic percent impurities.

16. A powder batch as recited in Claim 10, wherein not greater than about 1 weight percent of said battery particles are in the form of hard agglomerates.

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17. A thick-film paste composition suitable for screen printing onto a substrate, comprising:

- a) a binder phase;
- b) an organic vehicle phase; and
- c) a functional phase, said functional phase comprising fine battery particles, wherein said particles are substantially spherical and wherein said particles have a weight average particle size of from about 0.1 μm to about 10 μm and wherein said particles have a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.

18. A thick-film paste composition as recited in Claim 17, wherein said particles have a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

19. A thick-film paste composition as recited in Claim 17, wherein said weight average particle size is from about 1 μm to about 5 μm .

20. A thick-film paste composition as recited in Claim 17, wherein said weight average particle size is not greater than about 3 μm .

21. A thick-film paste composition as recited in Claim 17, wherein not greater than about 1 weight percent of said particles are in the form of hard agglomerates.

22. A battery comprising at least one electrocatalytic layer, wherein said electrocatalytic layer comprises fine battery particles having an average particle size of not greater than about 20 μm and wherein said particles have a substantially spherical morphology and said particles have a particle size distribution wherein at least about 80 weight percent of said particles are not larger than twice said average particle size.

23. An electrocatalytic device as recited in Claim 22, wherein said average particle size is at least about 0.3 μm .

24. An electrocatalytic device as recited in Claim 22, wherein said average particle size is not greater than about 10 μm .

25. An electrocatalytic device as recited in Claim 22, wherein said battery is a lithium-ion battery.

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26. A method for the production of fine battery particles, comprising the steps of:

- a) forming a liquid comprising precursors to a battery compound;
- b) generating an aerosol of droplets from said liquid; and
- c) pyrolyzing said droplets to remove liquid therefrom and at least partially react said precursors to form intermediate precursor particles; and
- d) heating said intermediate precursor particles to form a powder batch of battery particles.

27. A method as recited in Claim 26, wherein said pyrolyzing step comprises passing said droplets through a heating zone having a reaction temperature of from about 500°C to about 1000°C in an oxygen-containing gas.

28. A method as recited in Claim 26, wherein said liquid is a solution comprising a lithium metal precursor.

29. A method as recited in Claim 26, wherein said liquid is a solution comprising lithium nitrate.

30. A method as recited in Claim 26, wherein said step of generating an aerosol comprises ultrasonically atomizing said liquid.

31. A method as recited in Claim 26, wherein said step of generating an aerosol comprises the use of a nozzle atomizer.